Supplemental Information

Survival of Airborne MS2 Bacteriophage Generated from Human Saliva, Artificial Saliva, and Cell Culture Medium

Zhili Zuo[1#], Thomas H. Kuehn[1], Aschalew Z Bekele[2], Sunil Kamar[2], Harsha Verma[2], Sagar M. Goyal[2], Peter C. Raynor[3], and David Y. H. Pui[1]

[1]Department of Mechanical Engineering, College of Science and Engineering, University of Minnesota, 111 Church Street SE, Minneapolis, MN 55455, USA

[2]Department of Veterinary Population Medicine, College of Veterinary Medicine, University of Minnesota, 1333 Gortner Avenue, Saint Paul, MN 55108, USA

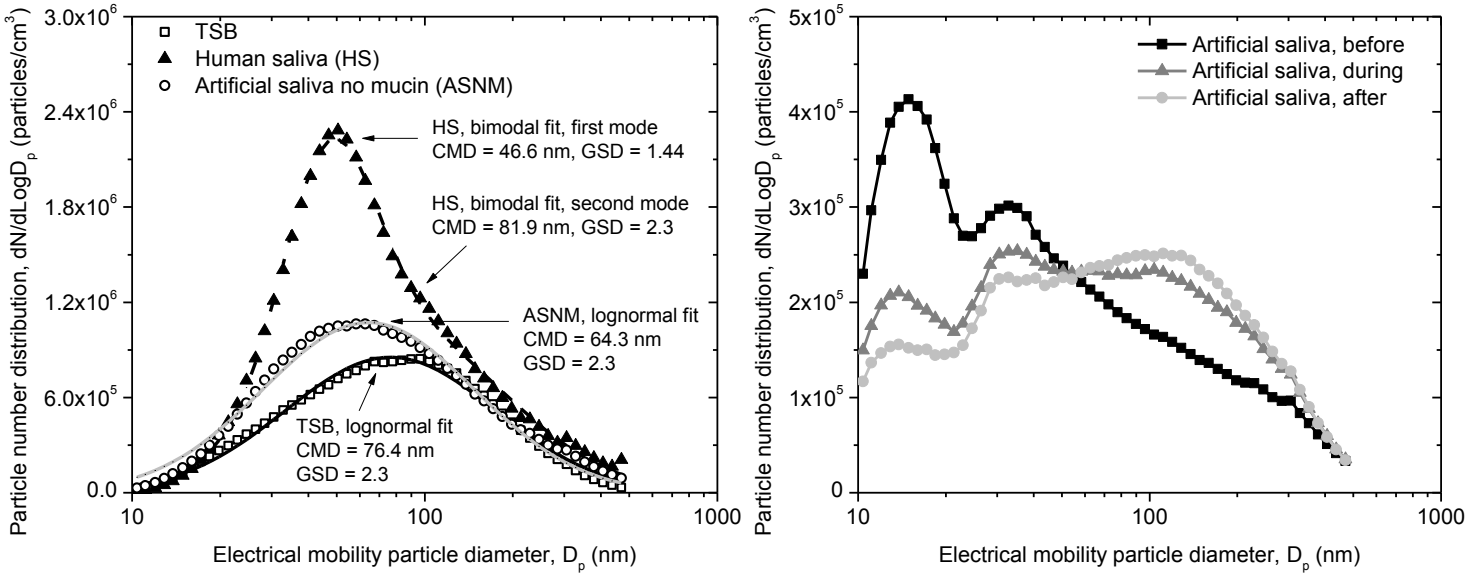
[3]Division of Environmental Health Sciences, School of Public Health, University of Minnesota, 1260 Mayo, 420 Delaware Street SE, Minneapolis, MN 55455, USA

[#]Corresponding author contact information: Department of Mechanical Engineering, College of Science and Engineering, University of Minnesota, 111 Church Street SE, Minneapolis, MN 55455, USA; Tel: +1-612-625-1510; E-mail: zuoxx011@umn.edu

Running title: virus survival in saliva aerosol

S1 Particle size distribution of the generated virus aerosols

Figure S1 shows the SMPS-measured particle number distribution of virus aerosols generated from cell culture medium (TSB), human saliva (HS), artificial saliva (AS), and artificial saliva with no mucin (ASNM). The size distributions of TSB and artificial saliva were lognormal while that of human saliva was bimodal (Figure S1). The particle size distributions of virus aerosol generated from artificial saliva measured before, during, and after the experiment were all different, suggesting an unstable output from the Collison nebulizer.



(a) (b)

FIG S1 Representative number distributions of virus aerosol particles generated from cell culture medium (TSB), human saliva, artificial saliva without mucin (a), and artificial saliva with mucin (b). Also shown are the lognormal and bimodal curve fittings with count median diameter (CMD) and geometric standard deviation (GSD).

S2 Comparison of virus size distribution and particle size distribution for TSB, AS, and ASNM

Figure S2 shows the normalized infectious virus and total virus size distributions from 100 to 450 nm for TSB, AS, and ASNM. Due to the unstable nebulizer output, the particle number and volume distributions of artificial saliva both before and after the experiments were plotted. For all the three nebulizer suspensions, it is clearly that the infectious and total virus distributions were better represented by the particle volume distribution rather than the particle number distribution, despite the large error bars.

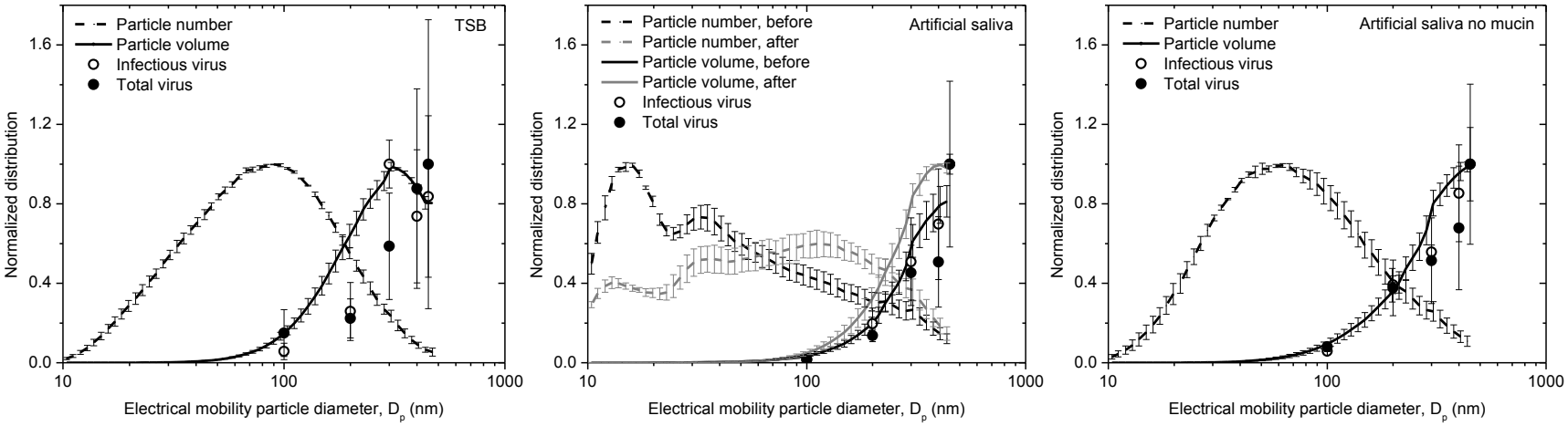


FIG S2 Normalized infectious virus size distribution, total virus size distribution, particle number distribution, and particle volume distribution for cell cultural medium (TSB), artificial saliva, and artificial saliva without mucin. Virus size distributions and particle size distributions were normalized by their highest values and superimposed for easy comparison. Values are means ± one standard deviation (n = 3). Results of TSB are from (1).

S3 Comparison of infectious virus and total virus carried per particle for TSB, AS, and ASNM

Figure S3 shows the amount of infectious virus (iv) and total virus (tv) carried per particle for TSB, AS, and ASNM. Similar to HS, there was a power law correlation between iv/tv and particle size for the three nebulizer suspensions. The larger the particle size, the more virus the particle can carry. In almost all the cases, the curve-fitting gave a power that was not significantly different from three, suggesting the amount of virus carried by a particle was proportional to the particle volume. In addition, iv and tv were much lower than 1 PFU/particle, even at 450 nm, indicating that there was a small fraction of particles actually carry virus.

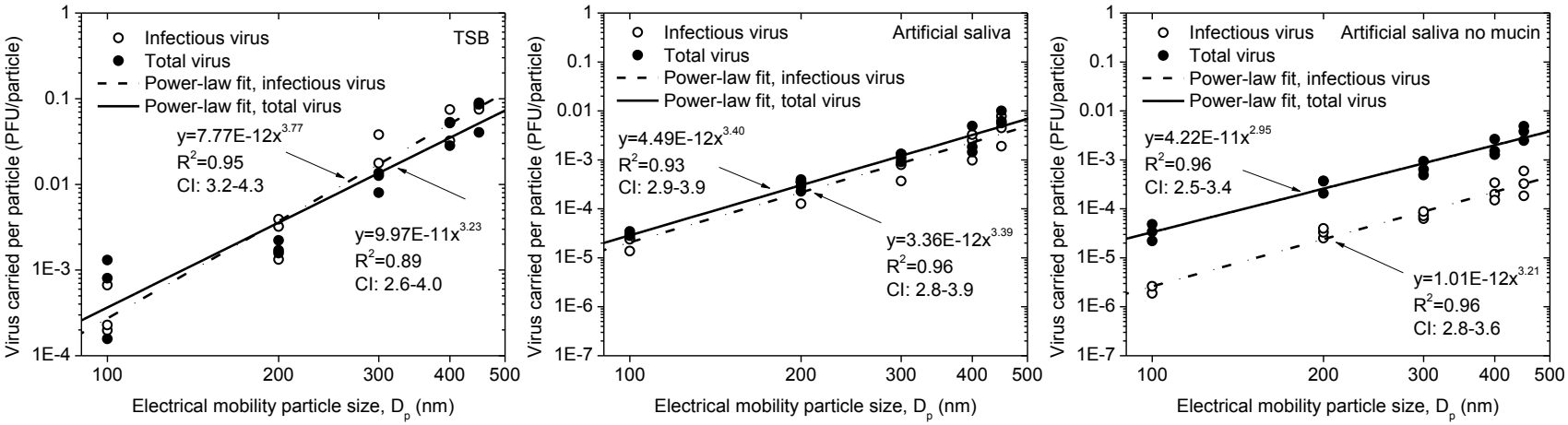


FIG S3 Amount of infectious virus and total virus carried per particle as function of particle size for cell cultural medium (TSB), artificial saliva, and artificial saliva without mucin. Also shown are the curve-fitting results with R-square values and 95% confident interval (CI) of the slopes, where x represents particle size in nm and y represents virus carried per particle in PFU/particle. Results of TSB are from (1).

REFERENCES

1. **Zuo Z, Kuehn TH, Verma H, Kumar S, Goyal SM, Appert J, Raynor PC, Ge S, Pui DYH**. 2013. Association of airborne virus infectivity and survivability with its carrier particle size. Aerosol Sci. Technol. **47:**373–382.